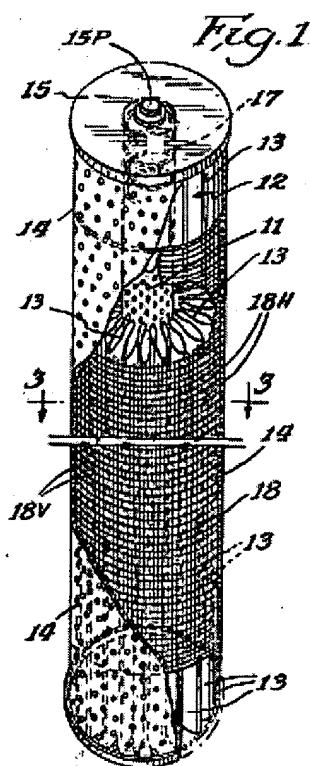


REMARKS

By the present amendment, claims 1-7, 10, 26, 39-46, and 52-65 have been cancelled and claims 66 - 79 have been added.

In the previous Office Action, the pending claims were rejected as being obvious over U.S. Patent No. 3,506,475 to MacDonnell in view of several secondary references. MacDonnell discloses a filter element 12 for a high pressure locomotive lubrication system comprising a pleated filter media, a netting 18, and an outer cover wrap 14. (See MacDonnell Figure 1, below.)



The MacDonnell netting 18 is provided to address the problem of the pleat collapsing that occurs due to a cold oil surge (e.g., engine startup). Apparently, the collected deposits on pleat faces can cause a collapsed pleat to stick or cake on the next adjacent pleat so that the collapse becomes permanent. The netting 18 functions as a “tension transmitting structure for ganging the pleats” which essentially causes the pleats

to collapse in a “group.”¹ MacDonnell describes the netting 18 as “extending in encircling relaxed about the outer peaks 13P of the pleat” and as having “a vertical dimension corresponding to about 75% of the length of height of the filter element.”² The netting 18 is attached to the filter media when “adhesive is appropriately applied along the lengths of the outer peaks.” The outer cover wrap 14, which surrounds the netting 18, “closely encircles” the filter media and seats in the upper and lower end caps 15 and 16. The wrap 14 is described as being made of paper, paperboard, or thin sheet metal which is perforated if the wrap 14 extends the full length of the filter.³

Claim 66, from which claims 67-79 depend, sets forth a filter element wherein the exoskeleton comprises a support screen that is thermally bonded⁴ to the radially-outer peaks of the filter media, that provides an at least 50% open flow area, and provides a tight array of attachment points supporting the pleats in an appropriately spaced and non-collapsed condition. As was explained above, the MacDonnell netting is specifically designed to allow the pleats to collapse and thus cannot support the pleats in the claimed manner.

Claim 66 also sets forth that the support screen comprises a sheet of screen material having a width approximately equal to the axial dimension of the filter media. This

1. With the MacDonnell netting, adjacent pleats are connected in a mechanically ganged relationship so that the circumferential flexing of any one pleat involves the circumferential flexing of a plurality of successively adjacent pleats. The stored energy is collectively applied through the netting 18 to effect positive return movement of the collapsed pleat in spite of any tendency to stick. (Moreover, each time a pleat flexes, any deposit building up on that pleat ends to fracture and drop off so that the flexing action continually tends to maintain the filter surfaces at their desired original permeability.) Significantly, MacDonnell expressly notes that “previous approaches have been directed at stabilizing the position of the pleats whereas in the present arrangement, the tendency to flex is freely permitted and is utilized to achieve improve filter performance.”

2. For example, for a 30 inch long filter element, the netting may be 22 inches long and centered with respect to the ends of the filter element.

3. MacDonnell teaches that the outer cover wrap 14 can be imperforate if it extends only part way of the length of the filter.

4. The non-adhesive attachment of the support screen advantageously eliminates the risk of adhesive drip beyond the attachment points, as dried/cured drip spots can undesirably reduce the flow area into the filter media.

construction allows for the entire axial length of the filter media to be supported by the screen and allows a uniform attachment array. In contrast, the MacDonnell netting 18 only extends about 75% the length of the filter media.

Claim 66 additionally sets forth that the filter element is characterized by the absence of a support structure surrounding the support screen. As such, there is no restriction of flow as would occur, for example, if the filter element included a perforated sleeve limiting flow to the areas aligned with the perforations. For this same reason, an even flow is established through all of the pleats in all areas of the individual pleats. The sleeve-free construction also eliminates a step in the filter assembly process⁵, reduces the cost of the filter, and/or decreases disposal parts upon filter replacement. MacDonnell, on the other hand, expressly teaches the inclusion of the outer cover wrap 14.

Claim 66 further sets forth that the filter media is formed from only cellulose-fiber-free and woven-mesh-free layers and that the filter element is characterized by the absence of cellulose-fiber and woven-mesh endoskeleton layers in the filter media. Applicants' exoskeleton support structure eliminates the need for conventional endoskeleton support layers whereby an increased pleat density is possible which translates into a higher contaminant removal efficiency. Also, a cellulose-fiber-free filter composition eliminates the moisture related problems (e.g., fiber swelling and subsequent pleat deformation) which are associated with cellulose fibers and which are known to dramatically reduce filter life.

MacDonnell notes that for diesel engine lubrication filters, it is preferred to utilize filter media of 100% cotton linters, and that its invention also finds application with other fibrous materials such as wood or synthetics. Moreover, there is no suggestion in MacDonnell, or any other applied reference, that a filter media is formed from only cellulose-fiber-free and woven-mesh-free layers would perform as required in a MacDonnell-like filter design. Specifically, for example, it is unclear whether such a filter

5. As is explained in applicants' specification, the end caps 18 and 20 are bonded to the ends of the filter media 14 with an adhesive or by other appropriate means. The adhesive can be applied across the entire annular end of the pleated media to also bond thereto the axial ends of the support screen 16 as well as the axial ends of the center tube 12 (if present). The filter element 10 is then complete and ready for use in the desired filtering situation.

media would be able to accomplish the desired "ganged circumferential pleat flexing" crucial to the MacDonnell invention.

In view of the foregoing, a filter element as set forth in claims 66-79 is believed to be patentable over U.S. Patent No. 3,506,475 to MacDonnell and the other prior art references of record, alone or in any obvious combination. The Examiner is asked to please contact the undersigned by telephone prior to the issuance of a further unfavorable action so that hopefully any outstanding issues can be resolved in an efficient manner.

Respectfully submitted,

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Date: October 25, 2005

Claudia Bader
Claudia Bader

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